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NEW SPECIES, RECORDS AND KEY TO TEXAS LIPOSCELIDAE (PSOCOPTERA)

Edward L. Mockford

Abstract.—Three new species of *Liposcelis* and one of *Belaphotroctes* are described from Texas: *Liposcelis hirsutoides, L. ornatus, L. pallidus* and *Belaphotroctes alleni.* New state records and additional distribution records of eight other species are included as well as a key to the 13 species of Liposcelidae now recorded from Texas.

The family Liposcelidae contains small psocids from 1–2 mm in body length, usually of somewhat flattened form with broad hind femora. Many of the species commonly invade houses and stored foods; these are called booklice. They have been incriminated along with dust mites as probable causative agents of asthmatic reactions (Spieksma and Smits, 1975). Some of the Liposcelids that occur in rangeland grasses are thought to be intermediate hosts of the fringed tapeworm of sheep (Allen, 1973).

Mockford and Gurney (1956) reviewed the psocids of Texas but did not include the Liposcelidae. Sommerman (1957) described three new species of *Liposcelis* from Texas, and Mockford (1963) described a new species of *Belaphotroctes* from that state. To date, these are the only published records of Liposcelidae from Texas. The present paper includes descriptions of three new species of *Liposcelis, L. hirsutoides, L. ornatus* and *L. pallidus,* and one new species of *Belaphotroctes, B. alleni.* Three species of *Liposcelis,* one of *Belaphotroctes* and one of *Embidopsocus* are recorded from Texas for the first time. These are *Liposcelis bostrychophilus* Badonnel, *L. knullei* Broadhead, *L. liparus* Broadhead, *Belaphotroctes badonneli* Mockford and *Embidopsocus* sp. Thus, the Texas liposcelid fauna is raised from 4 to 13 species. Records constituting important range extensions are included for *Belaphotroctes hermosus* Mockford, *Liposcelis deltachi* Sommerman and *L. nasus* Sommerman. A key to the species is included. Collecting for liposcelids in Texas has as yet been very scanty, and it is likely that additional collecting will produce more species.

Measurements were made on slide-mounted material with a filar micrometer. The micrometer unit = 0.462 μ. Abbreviations used in the measurements and descriptions are explained as follows: Mx4 = distal segment of maxillary palpus and its length (Table 1); H = greatest head width; f_1, f_2, f_3 = first, second and third flagellomeres and their lengths (Table 1); F + Tr = length of posterior femur + trochanter; FW = greatest

Table 1. Measurements (in μ) of Texas species of Liposcelidae. Abbreviations explained in text.

Name and Catalog Number	Mx4	H	f_1	f_2	f_3	F + tr	Fw	T
Belaphotroctes alleni ♀, ELM #2118	100	312	66	55	52	294	141	262
B. alleni ♀, ELM #2552	99	298	63	57	53	284	137	244
Liposcelis hirsutoides ♀, ELM #1673	84	282	53	53	52	284	160	222
L. hirsutoides ♀, ELM #1674	80	276	54	53	51	288	164	212
L. hirsutoides ♀, ELM #1674	89	292	48	54	60	288	179	216
L. hirsutoides ♀, ELM #4617	84	296	60	68	71	284	179	218
L. ornatus ♀, ELM #4617	78	264	63	—	—	274	170	200
L. ornatus ♀ ELM #4617	78	256	59	86	—	264	168	198
L. pallidus ♀, ELM #2117	—	326	108	161	187	386	208	280

Name and Catalog Number	t_1	t_2	t_3	SI	SII	MdIX	Se
Belaphotroctes alleni ♀, ELM #2118	55	38	49	60	—	139	114
B. alleni ♀, ELM #2552	54	35	48	58	—	134	138
Liposcelis hirsutoides ♀, ELM #1673	88	34	48	48	52	78	62
L. hirsutoides ♀, ELM #1674	88	37	49	43	45	80	73
L. hirsutoides ♀, ELM #1674	89	36	50	44	46	80	76
L. hirsutoides ♀, ELM #4617	87	33	43	44	46	82	—
L. ornatus ♀, ELM #4617	89	33	46	46	46	80	67
L. ornatus ♀, ELM #4617	84	36	50	40	42	77	69
L. pallidus ♀, ELM #2117	141	41	53	65	—	120	97

width of posterior femur; T = length of posterior tibia; t_1, t_2, t_3 = lengths of first, second and third posterior tarsomeres; SI = longest lateral seta of pronotum and its length (Table 1); SII = longest anterolateral marginal seta of mesonotum and its length (Table 1); MdIX = a specific long abdominal seta (Fig. 21) (nomenclature of Badonnel, 1962) and its length (Table 1); Se = longest seta of epiproct and its length (Table 1); Tg_1–Tg_{11} = abdominal terga 1–11.

The taxonomic categories of section, group and subgroup used in *Liposcelis* follow Badonnel (1962, 1963).

In the distribution records, the author was collector unless otherwise indicated. Catalogue numbers referred to in Table 1 are included with the records.

Subfamily Embidopsocinae

Embidopsocus sp.

The single specimen is a nymph and cannot be determined to species.

Record.—Texas: Cameron County: Southmost Palm Grove near Brownsville, 27 January 1958, beating branches of thorny trees, 1 nymph.

Belaphotroctes alleni Mockford, new species

Diagnosis.—Similar to *B. simberloffi* Mockford and *B. hermosus*, differing from both in having no closely-set group of sense clubs on ventral surface of Mx4 but having instead diffusely-arranged sense clubs in the same area (Fig. 45).

Female.—Measurements as given in Table 1. Morphology: Flagellum with short terminal segment partially fused with subterminal 1. Ocelli absent (only apterous forms known). Two units in each eye. Lacinial tip (Fig. 1) with outer and inner prongs bifid distally; denticle between these relatively broad. Mx4 (Fig. 2) with 3 blunt and 4 pointed sensilla dorsally; ventrally (Fig. 45) with scattered blunt sensilla in distal ½. Antennal sensilla: f_1 with 2 distal rods, 1 stouter than other; f_2 with 1 slender distal rod, f_5 and f_6 each with a stout distal rod; f_8 with a slender, curved distal rod, f_{10} with a stout distal rod, f_{12} with a slender curved distal rod. Pretarsal claw with denticle near tip and short, acuminate appendage near base. Spermapore sclerite (Fig. 3, compare to Fig. 7 of *B. hermosus*) slender, tapering toward opening. Sculpture of integument: Vertex with faint curved depressed lines enclosing (or partially enclosing) areoles; a series of fine vermiculate marks between antennal socket and eye on each side. Abdominal terga without sculpture except for faint transverse lines

bordering posterior ends of segments. Chaetotaxy: Vertex with scattered sparse setae showing much variation in length, laterals longer than centrals (a representative lateral = 35 μ, a representative central = 17 μ). Antennal orbit with a short posteromedian (< scape), long median (> scape + pedicel) and short anteromedian (< scape) seta. Pronotum (Fig. 4): Median lobes each with 2 setae near anterior margin; each lateral lobe with long SI and short scattered setae including 1 slightly longer than others near base of median lobe. Meso-metanotum with few, scattered setae. Prosternum (Fig. 5), with 4–5 setae on each lateral margin including an anterior minute 1, followed by a somewhat longer 1, followed just in front of middle by a much longer 1, followed near posterior margin by 1 somewhat shorter than previous 1. Meso-metasternal setae as in Fig. 5. Setae of Tg_{8-11} arranged as in Fig. 6; 1 pair of epiproctal setae much longer than others and curved. Color (in alcohol 14 years): Eye patches black. Well-sclerotized body areas yellowish brown, slightly darker in bands across abdominal terga 1–8.

Holotype ♀ and 3 ♀ paratypes, Texas, Jeff Davis County, Davis Mountains State Park, 25–26 July 1962, sifting ground litter of oak leaves and juniper debris, ELM #2118. The types are in my collection.

Additional record.—New Mexico: Chaves County: Roswell, Diamond A Ranch, 24 November 1959, R. W. Allen collector, 18 ♀, ELM #2552.

Note.—The material on which the description of *B. hermosus* was based contained a mixture of true *hermosus* and this species. Figure 14b in Mockford (1963) refers to this species; all other figures, all measurements and the description except for reference to this figure are based on true *hermosus*.

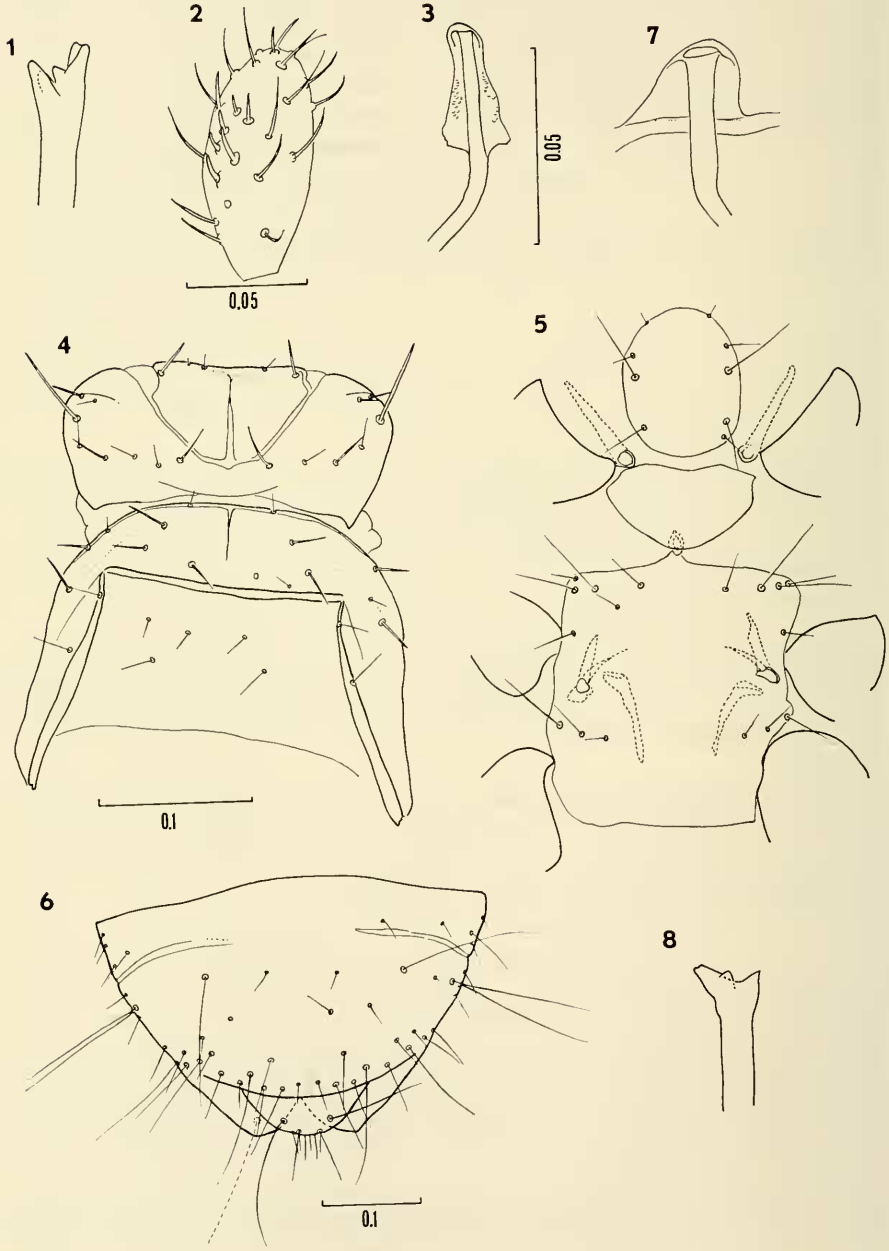
Etymology.—The species is named for Dr. Rex W. Allen, whose studies have strongly suggested that psocids may be vectors of the fringed tapeworm of sheep, *Thysanosoma actinioides* Diesing. This is one of the psocid species that Allen has used in his studies.

Belaphotroctes badonneli Mockford

Belaphotroctes badonneli Mockford, 1972:115.

This species was described from Alachua County, Florida and was previously known only from that area. The present record marks an extension of the range westward by approximately 750 miles and suggests a range around the northern Gulf Coast.

Record.—Texas: Matagorda County: State Highway 35, 8.3 miles along highway southwest of Old Ocean, 29 November 1975, beating broad-leaved trees, 1 ♀.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Belaphotroctes hermosus Mockford

Belaphotroctes hermosus Mockford, 1963:27.

The published records of this species as restricted by the description, above, of *B. alleni* are entirely from the Lower Rio Grande Valley. The following record extends the known range somewhat northward.

Record.—Texas: Brooks County: Laguna Salada, 5 miles southwest of Falfurrias, 5 September 1974, collector not indicated, 1 ♀.

Genus *Liposcelis*

Section I, Group A, Subgroup Aa

Liposcelis liparus Broadhead

Liposcelis liparus Broadhead, 1947:42.

This species has not been recorded previously from the Western Hemisphere but is known from England and South Africa. In addition to the Texas record cited below, I have several records from Arizona and New Mexico, and one from Nebraska.

Record.—Texas: Pecos or Terrell County (about at county line), 42.4 miles along U.S. Highway 90 east of Marathon, 25 July 1962, beating juniper, 1 ♀.

Section I, Group A, Subgroup Ab

Liposcelis deltachi Sommerman

Liposcelis delta-chi, Sommerman, 1957:127.

Published records of this species are only from the type-locality, Garner State Park, Uvalde County, Texas. The following records extend the known range east and west.

Records.—Texas: Jeff Davis County, Davis Mountains State Park, 25–26 July 1962, sifting ground litter, 1 ♀; Kleberg County, Kingsville, 7 October 1972, collector not indicated, 1 ♀; Pecos or Terrell County, 42.4 miles east of Marathon along U.S. Highway 90, 25 July 1962, beating junipers, 1 ♀; same locality and date, beating yucca, F. Hill collector, 1 ♀.

←

Figs. 1–6. *Belaphotroctes alleni.* 1, Lacinial tip, scale of Fig. 3. 2, Distal segment of maxillary palpus (Mx4), dorsal view. 3, Spermapore sclerite. 4, Thoracic terga showing chaetotaxy. 5, Thoracic sterna showing chaetotaxy, scale of Fig. 4. 6, Abdominal segments 8–11 showing dorsal chaetotaxy. 7, *Belaphotroctes hermosus,* spermapore sclerite, scale of Fig. 3. Fig. 8, *Liposcelis hirsutoides,* lacinial tip, scale of Fig. 3. Scales in mm.

Liposcelis hirsutoides Mockford, new species

Diagnosis.—Similar to *L. hirsutus* Badonnel, *L. distinctus* Badonnel and *L. puber* Badonnel. Differing from *L. hirsutus* and *L. puber* in paler coloration, from *L. distinctus* in having short, truncated setae of the *hirsutus* type on all abdominal terga. Also differing from *L. hirsutus* in smaller size and in having SII approximately parallel-sided.

Female.—Measurements as given in Table 1. Morphology: Median suture of vertex recognizable as a break in sculpture, edges of areoles abutting on it appearing scalloped. Eight units in each eye. Lacinial tip with prongs strongly diverging; outer prong slightly indented apically, inner acute apically. Mesothoracic parapsidal sutures visible as thin lines. Tg_1 with 3 transverse sclerotized bands, the anterior 2 interrupted medially. Intersegmental lines 2–3, 3–4, 4–5, 5–6, 6–7 and 7–8 of abdominal terga each marked in middle by a narrow dark band (Fig. 9). Common trunk of gonapophyses (Fig. 19) short and broad. T-shaped sclerite as in Fig. 18. Sculpture: Vertex (Fig. 12) with impressed lines enclosing transverse areoles, most of them bearing tubercles, usually arranged in rows. Abdominal terga (Fig. 13) with rather regularly spaced tubercles, some slightly darker than others, arranged in arcs, vaguely setting out areoles, but tubercles not in areolate pattern in some areas. Weakly sclerotized portions of Tg_{5-7} with sculpture in same pattern but less pronounced. Chaetotaxy: Setae of vertex long (a typical central seta = 20 μ) and tapering distally but not pointed at tips (Fig. 12), from about as long to about 2× as long as distances between their bases. Pronotum (Fig. 34) with SI decidedly longer than other setae of lateral lobe, slightly widened in its middle; 2 other setae forming anterior row, both slightly widened in their middles; 3 shorter setae posterior to these. Meso-metathorax with SII about same length as SI and almost imperceptibly widened in its middle. Six prosternal setae in an arc; mesosternal row of 9 setae (Fig. 20). Short (a typical seta of Tg_5 = 10.6 μ) truncated setae abundant on all abdominal terga. Setae of Tg_{8-11} as in Fig. 21. Color (in alcohol 3 months; specimens in alcohol 16 years generally paler): Eye patches black. Head, body and appendages generally medium grayish brown; abdominal terga slightly darker on sides than in middles; head with a slight orange hue. Tg_{1+2}, except anterior 2 sclerotized strips, paler than rest of body. A narrow dark line between each pair of adjacent abdominal terga from 2–8. Each of Tg_{5-7} pale along its entire posterior border.

Male.—The single male on hand is not in suitable condition to allow preparation of a description. The sexes were associated by similarity in color, sculpture of integument and chaetotaxy. There are five units in the eye.

Holotype female.—Texas, Cameron County, State Hwy. 4, 11 miles along

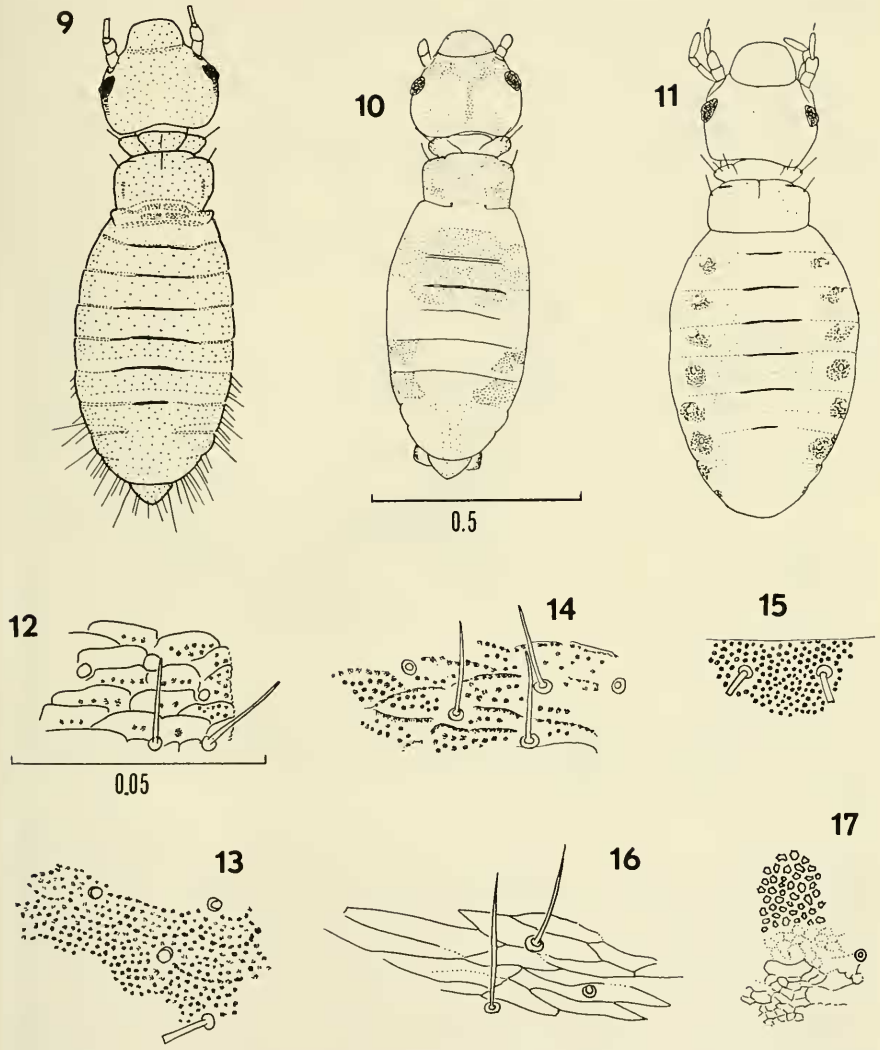
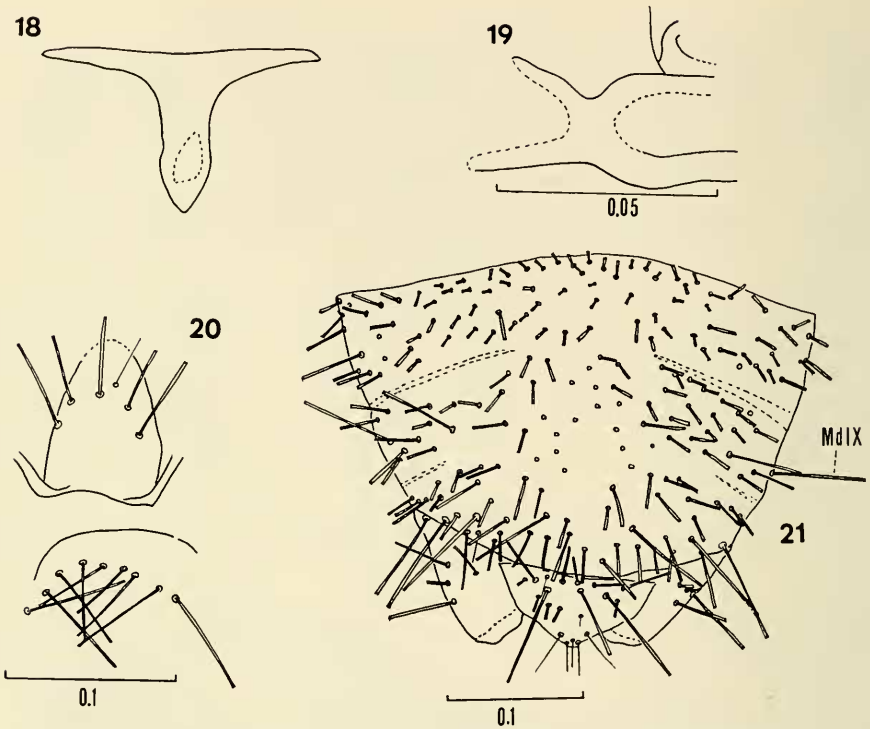


Fig. 9. *Liposcelis hirsutoides* ♀, dorsal view; appendages, except antennal bases, not shown; scale of Fig. 10. Fig. 10, *Liposcelis ornatus* ♀, dorsal view; appendages, except antennal bases, not shown. Fig. 11, *Liposcelis deltachi* ♀, dorsal view; appendages, except antennal bases and maxillary palpi, not shown. Fig. 12, *Liposcelis hirsutoides* ♀, sculpture of vertex bordering median ecdysial line. Fig. 13, *Liposcelis hirsutoides* ♀, sculpture of 4th abdominal tergum near middle. Fig. 14, *Liposcelis ornatus* ♀, sculpture of vertex near median ecdysial line. Fig. 15, *Liposcelis ornatus* ♀, sculpture of 4th abdominal tergum near middle. Fig. 16, *Liposcelis pallidus* ♀, sculpture of vertex in parietal region. Fig. 17, *Liposcelis pallidus* ♀, sculpture of 6th abdominal tergum near middle. Figs. 13–17 to scale of Fig. 12.



Figs. 18–21. *Liposcelis hirsutoides* ♀. 18, T-shaped sclerite, scale of Fig. 19. 19, Common trunk of gonapophyses. 20, Thoracic sterna showing chaetotaxy. 21, Abdominal terga 8–11 showing chaetotaxy.

highway east of junction with Farm Rd. 511, 30 January 1958, beating branches of thorny shrubs on old dune ridge, ELM #1674. Ten ♀ paratypes, 1 nymph, and 1♂ (not designated a paratype due to its poor condition), same data as holotype; 1 ♀ paratype, same data except one mile farther east on same highway. The types are in my collection.

Additional records.—Texas: Jim Wells County, 18 miles north of Alice along U.S. Highway 281, 10 June 1962, beating vegetation, F. Hill and E. L. Mockford collectors, 1 ♀; Matagorda County, State Hwy. 35, 2 miles along highway northeast of Van Vleck, 29 November 1975, beating broad-leaved trees and on tree trunks, 2 ♀, ELM #4617.

Liposcelis nasus Sommerman

Liposcelis nasus Sommerman, 1957:128.

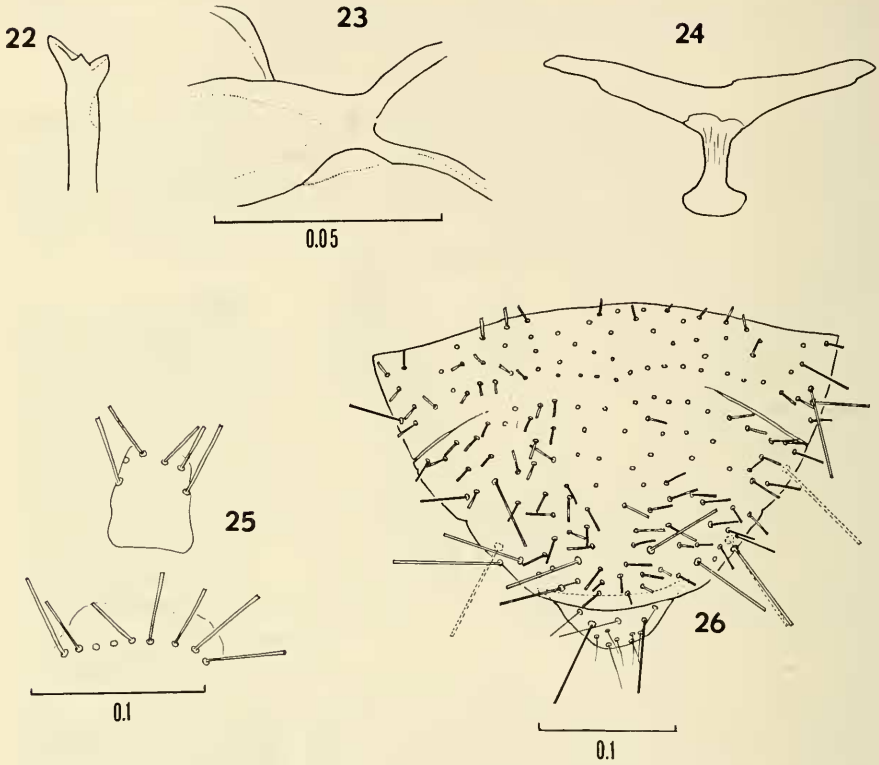
The following record extends the range of this species north of the Lower Rio Grande Valley, the area to which other published records are restricted.

Record.—Texas: Bexar County, San Antonio, Northwest Preserve Park, 29 June 1973, beating dried cut grass and oak litter, 1 ♀.

Liposcelis ornatus Mockford, new species

Diagnosis.—Marked with a striking pattern (Fig. 10) somewhat similar to those of *L. marginepunctatus* Badonnel, *L. nigrofasciatus* Badonnel and *L. fasciatus* Enderlein. Differing from *L. marginepunctatus* in lacking series of lateral spots on each side of abdomen. Differing from *L. nigrofasciatus* and *L. fasciatus* in lacking transverse dark bands of terga in posterior half of abdomen.

Female.—Measurements as given in Table 1. Morphology: Median suture of vertex indicated by slight break in sculpture. Eight units in each eye. Lacinial tip (Fig. 22) normal for the genus. Mesothoracic parapsidal sutures developed as distinct arched lines. Tg_1 apparently uniformly sclerotized. Intersegmental lines 2–3, 3–4, 4–5, 5–6, 6–7 and 7–8 of abdominal terga each marked in middle by a narrow dark band, those of 3–4 and 4–5 more obvious than others (Fig. 10). Common trunk of gonapophyses (Fig. 23) relatively short and broad. T-shaped sclerite as in Fig. 24. Sculpture: Vertex (Fig. 14) with impressed lines partially enclosing transverse areoles, most of them bearing vague tubercles, the tubercles, instead of lines, forming margins of areoles in places. Abdominal terga (Fig. 15) with regularly spaced minute tubercles. Weakly sclerotized portions of Tg_{5-7} with same pattern, somewhat less pronounced. Chaetotaxy: Setae of vertex as described for *L. hirsutoides*. Pronotum (Fig. 32) with SI decidedly longer than other setae of lateral lobe, but other (3) setae of anterior row each at least ⅔ length of SI; 3 short setae posterior to these. Meso-metathorax with SII about same length as SI. Six prosternal setae in row of 4 and 2 more posterior; mesosternal row of 9 setae (Fig. 25). Setae of Tg_{8-11} as in Fig. 26. Color (in alcohol 3 months): Eye patches black. Ground color of head dull ivory, of thorax and abdomen dull ivory to white. Postclypeus grayish brown. A medium brown band along midline of vertex to frontal area, there dividing into 2 arms, each running to antennal base. Antennae grayish brown. Propleura medium brown. A medium brown area covering each side of meso-metanotum and upper parts of corresponding pleura. A brown spot on each side of midline in Tg_1, a broad brown band, somewhat irregular on its lateral edges, covering most of Tg_3 and Tg_4 and extending on each side of midline onto Tg_5. A brown spot surrounding the spiracle on each side of Tg_7 and another pair of such spots on Tg_8. Tg_{9-11} with a slight brownish wash. Antennae pale brown. Legs each with a diffuse brown spot dorsally on the femur; tibiae each with a diffuse brown band near distal end and scattered brown pigment granules more basally. Tarsomeres pale brown, somewhat darker in first than in others.



Figs. 22–26. *Liposcelis ornatus* ♀. 22, Lacinial tip, scale of Fig. 23. 23, Common trunk of gonapophyses. 24, T-shaped sclerite, scale of Fig. 23. 25, Thoracic sterna showing chaetotaxy. 26, Abdominal terga 8–11 showing chaetotaxy.

Male.—Unknown.

Holotype female.—Texas, Matagorda County, State Highway 35, 2 miles along highway northeast of Van Vleck, 29 November 1975, beating broad-leaved trees and on tree trunks. Five ♀ paratypes, same data as for holotype. The types are in my collection.

Additional records: UNITED STATES: Florida: Alachua County, Cross Creek, 15 November 1952, beating red maples along creek, 1 ♀; Gainesville, 16 November 1952, beating palm leaves, 1 ♀; Newnan's Lake, 28 March–11 June 1952, trunks and branches of broad-leaved trees and vines in hammock, 4 ♀, 3 nymphs; Glades County, 8.6 miles south of Brighton on State Highway 781, 18 April 1954, beating live oak in palmetto-dominated hammock, 1 ♀; Hendry County, State Highway 833, locality

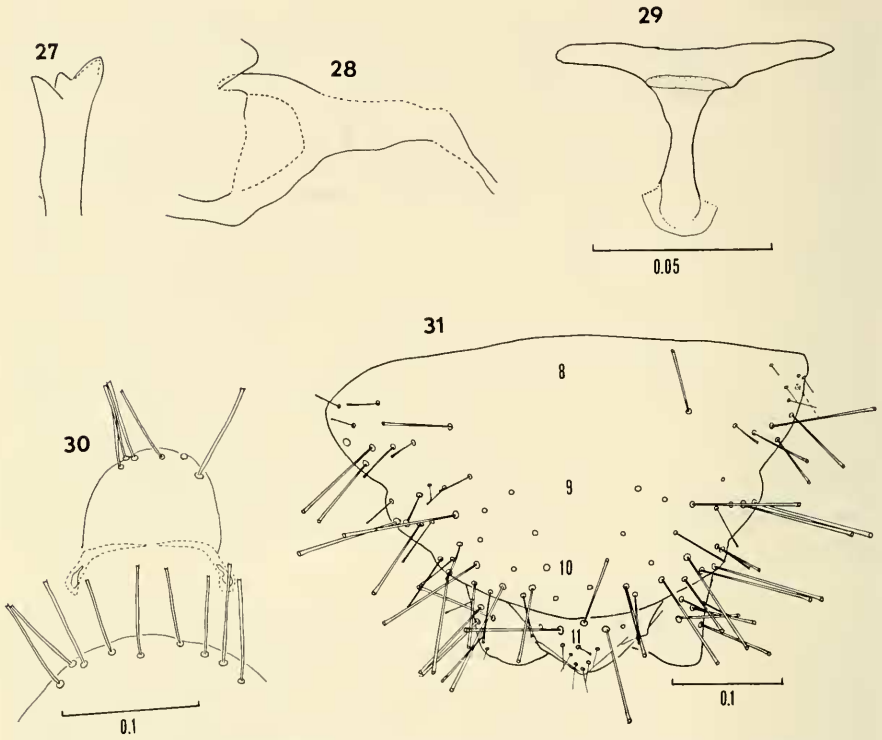
not recorded, 16 April 1954, beating broad-leaved trees and shrubs, and on trunks and foliage of *Sabal palmetto*, 2 ♀, 1 nymph; Highlands County, Highlands Hammock State Park, 3 March 1956, beating dead cabbage palm leaves in hammock, 4 ♀; Indian River County, Vero Beach, 18 April 1954, beating broad-leaved shrubs and trees and *Sabal palmetto* leaves in dune hammock, 5 ♀; Levy County, Seahorse Key, 28 June 1953, beating broad-leaved shrubs, 1 ♀; Inglis, collected 9 June 1965 from laboratory culture from this locality, 5 ♀; Polk County, Avon Air Force Base, 4 March 1956, beating saw palmetto leaves in cypress dome, 1 nymph; Sarasota County, Myakka River State Park, 30 August 1951, *ex* cabbage palm trunk, 1 ♀. Louisiana: Orleans Parish, New Orleans, 1 December 1965, beating vegetation in Audubon Park, 1 ♀. MEXICO: San Luis Potosi, Tamazunchale, 18 June 1966, beating ferns, bromeliads, and cabbage palms, 6 ♀, E. L. Mockford, R. Sloan and A. Manzano collectors. Tabasco, 4 miles southwest of Frontera, 3 July 1966, beating cacao foliage, 1 ♀.

Note.—The species was reared in culture at this laboratory through several generations in 1966. It proved to be obligatorily thelytokous, lacking males entirely.

Liposcelis pallidus Mockford, new species

Diagnosis.—Similar to *L. villosus* Mockford in color and chaetotaxy but differing in sculpture, resembling *L. reticulatus* Badonnel, *L. laparvensis* Badonnel, and *L. discalis* Badonnel in having finely reticulate sculpture on membranous zones of abdomen; but this sculpture irregular in size of reticulations and in relative fineness (Fig. 17). Similar in color to *L. nasus* and *L. pallens* Badonnel, differing from both in details of sculpture and in possessing only one relatively long seta anteriorly on each lateral pronotal lobe in addition to SI.

Female.—Measurements as given in Table 1. Morphology: Region of median suture of vertex not showing a break in sculpture. Eight units in each eye. Lacinial tip as in Fig. 27. Mesothoracic parapsidal sutures not visible. Tg_1 partly obscured by material in digestive tract; visible part appearing uniform in sclerotization. Intersegmental lines 4–5 and 5–6 each marked dorsally in middle by a narrow, dark, double band; a narrower single band marking intersegmental line 6–7. Common trunk of gonapophyses elongate (Fig. 28). T-shaped sclerite as in Fig. 29. Sculpture: Vertex (Fig. 16) with impressed lines enclosing transverse, smooth areoles; occasional short segments of the lines faint or absent. Abdominal terga beset with closely-spaced, small polygonal tubercles; on Tg_6 and Tg_7 these changing abruptly in weakly sclerotized posterior ½ of tergum to faint lines in reticulate pattern becoming bolder more posteriorly (Fig. 17).



Figs. 27–31. *Liposcelis pallidus* ♀. 27, Lacinial tip, scale of Fig. 29. 28, Common trunk of gonapophyses, scale of Fig. 29. 29, T-shaped sclerite. 30, Thoracic sterna showing chaetotaxy. 31, Abdominal terga 8–11 showing chaetotaxy.

Chaetotaxy: Setae of vertex (Fig. 16) long and tapering to fine points. Pronotum (Fig. 33) with SI approximately parallel-sided and decidedly longer than single other seta of lateral lobe. Other seta of lateral lobe anterior, slightly swollen medially. Meso-metatergum with SII somewhat shorter than SI. Prosternal setae apparently 6 in an anterior arc with 2 lateral setae longest (Fig. 30). Mesosternal row of 9 or 10 setae. Tg_{1-6} bearing very few, scattered, short, pointed setae. Setae of Tg_{8-11} as in Fig. 31. Color (in alcohol 14 years): Eye patches black. Head, body, and appendages generally dull yellow; reddish-brown subcuticular pigment granules scattered along sides of head, thorax and abdomen.

Holotype ♀ and one ♀ paratype, Texas, Jeff Davis County, 8.2 miles southeast of Fort Davis along State Highway 118, 25 July 1962, beating yucca, ELM #2117. The types are in my collection.

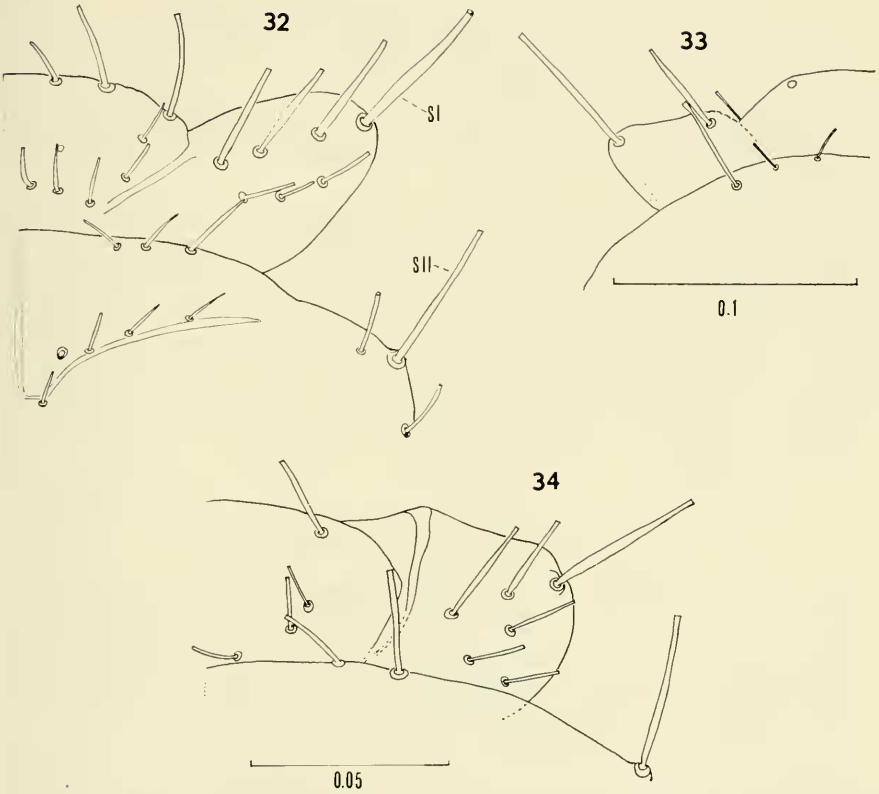


Fig. 32. *Liposcelis ornatus* ♀, right halves of pro- and mesonota showing chaetotaxy, scale of Fig. 34. Fig. 33, *Liposcelis pallidus* ♀, left halves of pro- and mesonota showing chaetotaxy. Fig. 34, *Liposcelis hirsutoides* ♀, right halves of pro- and mesonota showing chaetotaxy.

Section I, Group B, Subgroup Bb

Liposcelis knullei Broadhead

Liposcelis knullei Broadhead, 1971:264.

The species was previously known from Wooster, Ohio and Ottawa, Ontario. With the present record, a wide distribution both north–south and east–west in eastern North America is indicated.

Record.—Texas: Panola County, 5.6 miles south along U.S. Highway 59 from Carthage, 28 November 1975, beating oaks and pines, 2 ♀.

Section II, Group D

Liposcelis bostrychophilus Badonnel

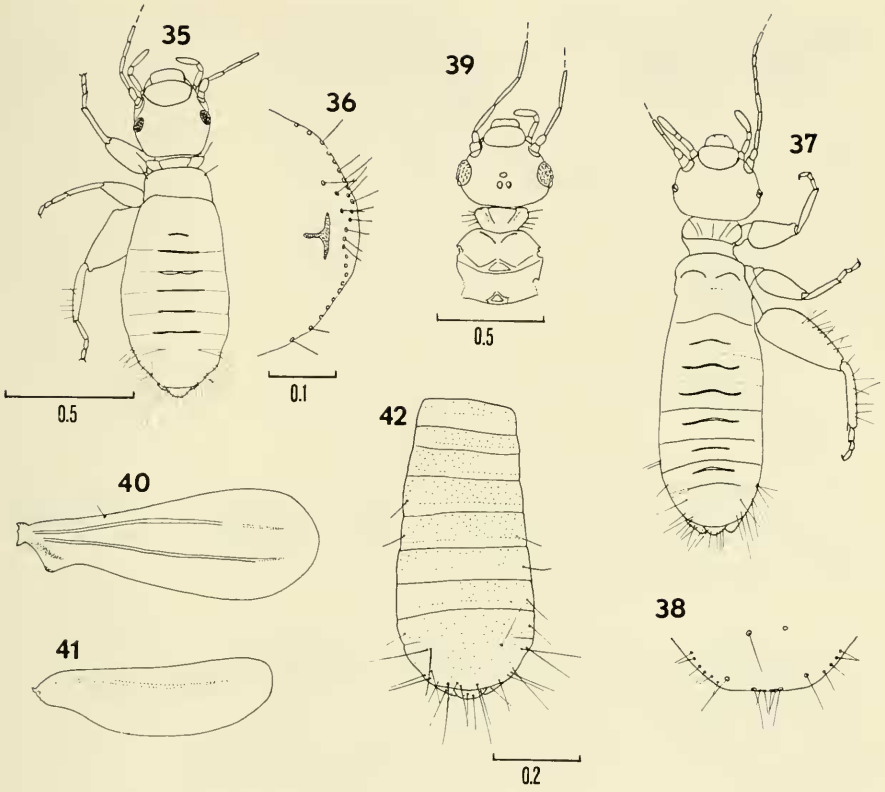
Liposcelis bostrychophilus Badonnel, 1931:251.

The species is widely distributed. In North America, it has been recorded from the boundary area of Georgia and Florida, and from Ottawa, Ontario.

Records.—Texas: Cameron County, State Highway 4, 11 miles east of junction with County Road 511, 30 January 1958, beating dead branches of thorny shrubs on old dune ridges, 1 ♀; Hidalgo County, Bentsen Rio Grande Valley State Park, 28 January 1958, beating palms and branches of thorny trees and shrubs, and sifting ground litter, 24 ♀, 8 nymphs; Kleberg County, Kingsville, 28 August 1977, in stored grain, numerous ♀ and nymphs, R. Schmidt collector; Lee County, 2.5 miles north of Giddings on Highway 77, 10 June 1962, 1 ♀, E. L. Mockford, F. Hill and J. M. Campbell collectors.

Key to the Texas Species of Liposcelidae

1. Hind femur bearing a lateral protuberance. Female subgenital plate with a T-shaped sclerite. Apterous forms only (Figs. 35 and 36) Subfamily Liposcelinae, genus *Liposcelis* 5
– Hind femur lacking a lateral protuberance. Female subgenital plate without a T-shaped sclerite. Males apterous, females generally in macropterous and apterous forms (Figs. 37–41) Subfamily Embidopsocinae 2
2. Mx4 less than 1.5× as wide in middle as next segment. Tg_{3-8} each with a slender, heavily sclerotized transverse strip (Fig. 37) Genus *Embidopsocus* (*E.* sp.).
– Mx4 at least 1.5× as wide in middle as next segment. Tg_{3-8} lacking sclerotized transverse strips (Fig. 42). Genus *Belaphotroctes* 3
3. Female with Mx4 fully 2× as wide in middle as next segment and bearing on its lower surface 2 groups of closely-set rod-like sensilla (Fig. 43). Corticolous species *Belaphotroctes badonneli* Mockford
– Female with Mx4 about 1.5× as wide in middle as next segment and bearing on its lower surface a single group of closely-set rod-like sensilla, or scattered, short sensilla (Figs. 44, 45). Ground litter species 4
4. Female with 1 group of closely-set rod-like sensilla on lower surface of Mx4 (Fig. 44) *Belaphotroctes hermosus* Mockford
– Female with scattered rod-like sensilla on lower surface of Mx4 (Fig. 45) *Belaphotroctes alleni*, new species



Figs. 35–36. *Liposcelis liparus* ♀. 35, Dorsal view with left legs. 36, Subgenital plate with T-shaped sclerite. Figs. 37–41, *Embidopsocus laticeps* ♀. 37, Dorsal view of apterous female with right legs, scale of Fig. 35. 38, Subgenital plate, scale of Fig. 36. 39, Head and thorax of macropterous female, dorsal view. 40, Forewing of macropterous female, scale of Fig. 35. 41, Hindwing of macropterous female, scale of Fig. 35. Fig. 42, *Belaphotroctes* sp., abdominal terga.

5. Tg_{3-4} uniform in color, not presenting a pale posterior membranous band (Fig. 46) Section I 6
– Tg_{3-7} annulate, i.e., each presenting a pale posterior membranous band with sculpture different from that of anterior portion of tergum (Fig. 47) Section II *Liposcelus bostrychophilus* Badonnel
6. SI of pronotum long and strong, about equal in length to distance between its base and anteromedial margin of lateral pronotal lobe; lateral pronotal lobe with either a transverse row of long, strong setae or a single 1 in addition to SI (Figs. 32–34) Group A 7
– SI of pronotum not so long and strong, in length decidedly less

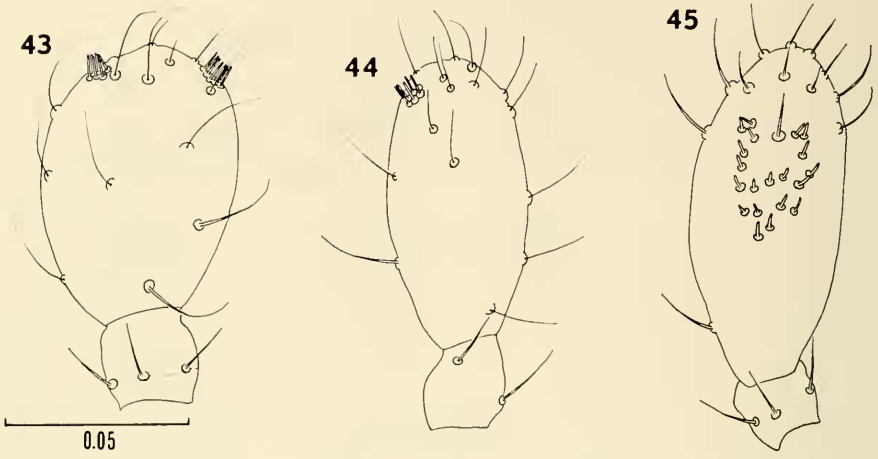


Fig. 43. *Belaphotroctes badonneli* ♀, distal 2 segments of maxillary palpus, ventral view. Fig. 44, *Belaphotroctes hermosus* ♀, distal 2 segments of maxillary palpus, ventral view. Fig. 45, *Belaphotroctes alleni* ♀, distal 2 segments of maxillary palpus, ventral view. All to same scale.

than distance between its base and anteromedial margin of lateral pronotal lobe; all other setae of lateral pronotal lobe much shorter than SI (Fig. 48) Group B 12

7. Two very long, curved, fine setae on epiproct (Fig. 49) *Liposcelis liparus* Broadhead
- Epiproct lacking pair of long, curved, fine setae 8
8. A single long, strong seta on lateral lobe of pronotum in addition to SI (Fig. 33) *Liposcelis pallidus*, new species
- A transverse row of long, strong setae on each lateral lobe of pronotum in addition to SI (Figs. 32 and 34) 9
9. Body color essentially uniform pale brown or buffy yellow. 10
- Body color a contrasting pattern of brown or reddish-brown marks on a creamy white background 11
10. Body color pale brown except white on Tg_{1+2} (Fig. 9); short, truncate setae abundant on all abdominal terga (Fig. 50) *Liposcelis hirsutoides*, new species
- Body color buffy yellow except anterior ½ of head, gradually darkening to rusty brown on clypeus and labrum; short setae of abdominal terga slender and sparse (Fig. 51) *Liposcelis nasus* Sommerman
11. Body marked with a series of reddish-brown spots along each side of abdomen (Fig. 11) *Liposcelis deltachi* Sommerman

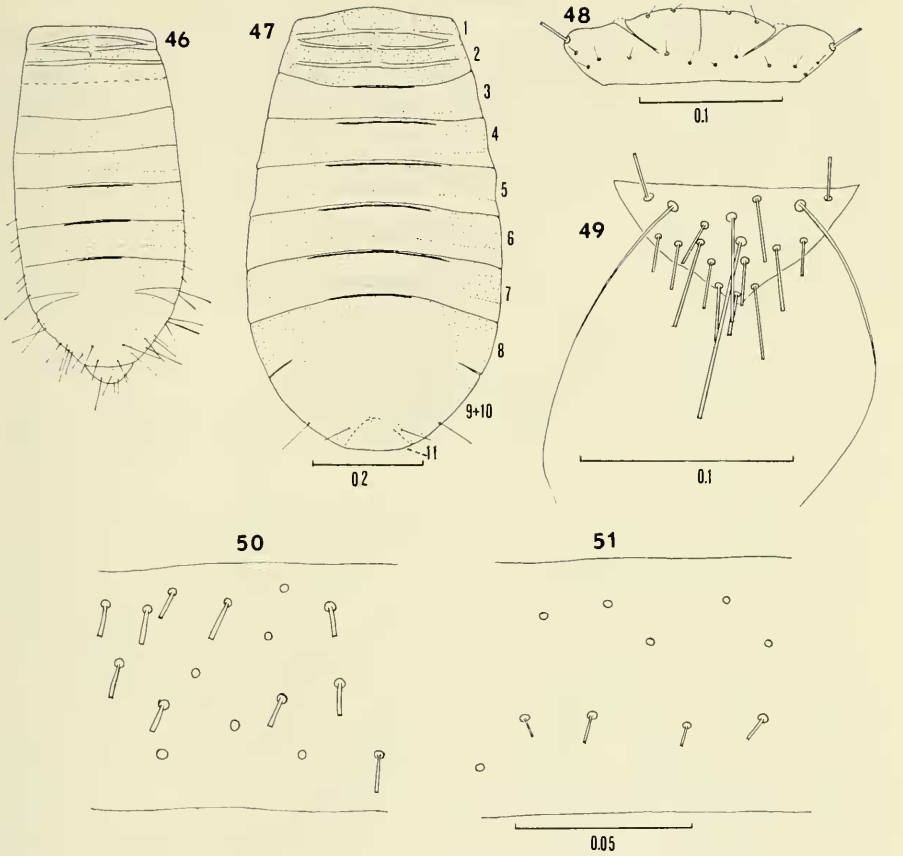


Fig. 46. Abdominal terga of *Liposcelis* species of Section I (*L. simulans* Broadhead shown here), scale of Fig. 47. Fig. 47, Abdominal terga of *Liposcelis* species of Section II (*L. bostrychophilus* shown here). Fig. 48, Pronotal chaetotaxy of *Liposcelis* species of Group B (*L. knullei* shown here). Fig. 49. *Liposcelis liparus* ♀ epiproct. Fig. 50, *Liposcelis hirsutoides* ♀, setae of 5th abdominal tergum in middle, scale of Fig. 51. Fig. 51, *Liposcelis nasus* ♀, setae of 5th abdominal tergum in middle.

– Body marked with variegated brown pattern on head and thorax, a broad, brown crossband on Tg_{3-5}, lateral brown spots on Tg_{9-11} (Fig. 10) *Liposcelis ornatus*, new species

12. Body color medium brown; lacinial tip with inner prong grooved, a short denticle at base of inner prong (Sommerman, 1957, Fig. 1) *Liposcelis lacinia* Sommerman

– Body color dark brown; lacinial tip with inner prong not grooved and lacking a basal denticle *Liposcelis knullei* Broadhead

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Literature Cited

Allen, R. W. 1973. The biology of *Thysanosoma actinioides* (Cestoda: Anoplocephalidae) a parasite of domestic and wild ruminants. N.M. State Univ. Agric. Expt. Stn. Bull. 604:1–69.

Badonnel, A. 1931. Contribution à l'étude de la faunne du Mozambique. 4[e] note.—Copeognathes. Ann. Sci. Nat. Zool. 14:229–260.

———. 1962. Psocoptères. Biologie de l'Amérique Australe I:185–229.

———. 1963. Psocoptères terricoles, lapidicoles, et corticoles du Chili. Biologie de l'Amérique Australe II:291–338.

Broadhead, E. 1947. New species of *Liposcelis* Motschoulsky (Corrodentia, Liposcelidae) in England. Trans. R. Entomol. Soc. London 98:41–58.

———. 1971. A new species of *Liposcelis* (Psocoptera, Liposcelidae) from North America with records of another species. J. Nat. Hist. 5:263–270.

Mockford, E. L. 1963. The species of Embidopsocinae of the United States (Psocoptera: Liposcelidae). Ann. Entomol. Soc. Am. 56:25–37.

———. 1972. New species, records, and synonymy of Florida *Belaphotroctes* (Psocoptera: Liposcelidae). Fla. Entomol. 55:153–163.

Mockford, E. L. and A. B. Gurney. 1956. A review of the psocids, or book-lice and bark-lice, of Texas. J. Wash. Acad. Sci. 46:353–368.

Sommerman, K. M. 1957. Three new species of *Liposcelis* (= *Troctes*) (Psocoptera) from Texas. Proc. Entomol. Soc. Wash. 59:125–129.

Spieksma, F. T. M. and C. Smits. 1975. Some ecological and biological aspects of the booklouse *Liposcelis bostrychophilus* Badonnel 1931 (Psocoptera). Neth. J. Zool. 25:219–230.

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